What is claimed is:

1. A method for producing a Ravigneaux gearset having gearset parameters that permit assembly of a gearset including mutually identical short pinions, spaced at equal radial distance from and equal angular intervals about an axis, meshing with a sun gear, mutually identical long pinions each meshing with two adjacent short pinions, a long sun gear and ring gear, the method comprising the steps of:

determining a number of gear teeth for each gear and pinion that would in combination produce desired gear ratios;

determining current gearset parameters including distances and angles relating the positions of the gears and pinions;

determining, for a predetermined angular rotation of a selected gear or pinion, and using the current gearset parameters, an error representing a difference in phases of a tooth on the selected gear or pinion into its mesh cycle, a first phase being determined along a first portion of a drive path of meshing gears and pinions, a second phase determined along a second portion of the drive path distinct from the first portion;

repetitively changing one or more of the current gearset parameters to determine a set of optimal gearset parameters for which the error is in the range between zero and a magnitude of single pair backlash of the gearset; and

producing a gearset having the optimal gearset parameters.

2. The method of claim 1, wherein the step of producing, further comprises:

placing the long pinions and short pinions, sized and located in accordance with the optimal gearset parameters, in a carrier that rotates about the short sun gear.

3. The method of claim 1, further comprising:

determining, on the basis of the number of gear teeth, a base circle size for the gears and pinions.

4. The method of claim 1, wherein the step of determining a center distance for each mesh of a first gear with a second gear, further comprises:

determining a gearset module and helix angle for the gears; and

determining each center distance such that $D = \frac{(N_1 + N_2) * Module}{2 * \cos(HelixAngle)}$

wherein D is the center distance, and N is the respective number of teeth of each gear of the mesh.

5. The method of claim 1, wherein the step of determining the current gearset parameters relating the position of the gears and pinions further comprises:

determining a base circle diameter for the short sun gear, short pinions, long pinions and ring gear;

determining the length and center distance of a first line connecting a center of the short sun gear and a center of a long pinion;

determining the length and center distance of a second line connecting a center of the short sun gear and a center of a first short pinion meshing with said long pinion;

determining the length and center distance of a third line connecting a center of the short sun gear and a center of a second short pinion meshing with said long pinion; and

determining the magnitude of an included angle between the first line and second line.

6. The method of claim 1, further comprising:

determining, on the basis of the number of gear teeth and a symmetric arrangement of the short sun gear, short pinions and long pinions, a base circle size for the gears except the short pinions such that N1/B1 = N2/B2, wherein N is the number of teeth and B is the base circle diameter, of the respective gears.

7. The method of claim 1, further comprises:

selecting a target number of teeth for the short pinions.

8. The method of claim 1, further comprises:

selecting a target number of teeth for the short pinions that most closely produces a desired symmetrical arrangement of the short pinions located on opposite sides of a line connecting a center of the short sun gear and a center of the long pinion.

9. The method of claim 1, wherein the step of repetitively changing one or more of the current gearset parameters further comprises:

selecting a first center distance connecting a center of the short sun gear and a center of a long pinion; and

determining a second center distance connecting a center of the short sun gear and a center of a short pinion that corresponds to the first center distance.

10. The method of claim 1, wherein the step of producing, further comprises:

placing four long pinions and four short pinions, sized and located in accordance with the optimal gearset parameters, in a carrier that rotates about the short sun gear.

11. The method of claim 1, wherein the step of producing, further comprises:

placing five long pinions and five short pinions, sized and located in accordance with the optimal gearset parameters, in a carrier that rotates about the short sun gear.

12. A method for producing a Ravigneaux gearset having gearset parameters that permit assembly of a gearset including mutually identical short pinions, spaced at

equal radial distance from and equal angular intervals about an axis, meshing with a sun gear, mutually identical long pinions each meshing with two adjacent short pinions, a long sun gear and ring gear, the method comprising the steps of:

determining a number of gear teeth for each gear and pinion that would in combination produce desired gear ratios;

determine a set of constant gearset parameters including base circle sizes, and distances and angles relating the positions of the gears and pinions in a symmetric arrangement of gear and pinions about the short sun;

determining current gearset parameters corresponding to the constant gearset parameters and the number of gear teeth;

determining, for a predetermined angular rotation of a selected gear or pinion, and using the current gearset parameters, an error representing a difference in phases of a tooth on the selected gear or pinion into its mesh cycle, a first phase being determined along a first portion of a drive path of meshing gears and pinions, a second phase determined along a second portion of the drive path distinct from the first portion;

repetitively changing one or more of the current gearset parameters to determine a set of optimal gearset parameters for which the error is in the range between zero and a magnitude of backlash for a single gear pair of the gearset; and

producing a gearset having the optimal gearset parameters.

13. The method of claim 12, wherein the step of producing, further comprises:

placing the long pinions and short pinions, sized and located in accordance with the optimal gearset parameters, in a carrier that rotates about the short sun gear.

14. The method of claim 12, further comprising:

determining, on the basis of the number of gear teeth, a base circle size for the gears except the short pinions.

15. The method of claim 12, wherein the step of determining a center distance for each mesh of a first gear with a second gear, further comprises:

determining a gearset module and helix angle for the gears; and

determining each center distance such that $D = \frac{(N_1 + N_2) * Module}{2 * \cos(HelixAngle)}$

wherein D is the center distance, and N is the respective number of teeth of each gear of the mesh.

16. The method of claim 12, wherein the step of determining the current gearset parameters relating the position of the gears and pinions further comprises:

determining a base circle diameter for the short sun gear, short pinions, long pinions and ring gear;

determining the length and center distance of a first line connecting a center of the short sun gear and a center of a long pinion;

determining the length and center distance of a second line connecting a center of the short sun gear and a center of a first short pinion meshing with said long pinion;

determining the length and center distance of a third line connecting a center of the short sun gear and a center of a second short pinion meshing with said long pinion; and

determining the magnitude of an included angle between the first line and second line.

17. The method of claim 12, further comprising:

determining, on the basis of the number of gear teeth and a symmetric arrangement of the short sun gear, short pinions and long pinions, a base circle size for the gears except the short pinions such that N1/B1 = N2/B2, wherein N is the number of teeth and B is the base circle diameter, of the respective gears.

18. The method of claim 12, further comprises:

selecting a target number of teeth for the short pinions.

19. The method of claim 12, further comprises:

selecting a target number of teeth for the short pinions that most closely produces a desired symmetrical arrangement of the short pinions located on opposite sides of a line connecting a center of the short sun gear and a center of the long pinion.

20. The method of claim 12, wherein the step of repetitively changing one or more of the current gearset parameters further comprises:

selecting a first center distance connecting a center of the short sun gear and a center of a long pinion; and

determining a second center distance connecting a center of the short sun gear and a center of a short pinion that corresponds to the first center distance.

21. The method of claim 12, wherein the step of producing, further comprises:

placing four long pinions and four short pinions, sized and located in accordance with the optimal gearset parameters, in a carrier that rotates about the short sun gear.

22. The method of claim 12, wherein the step of producing, further comprises:

placing five long pinions and five short pinions, sized and located in accordance with the optimal gearset parameters, in a carrier that rotates about the short sun gear.